

Digital Temperature Controllers

E5CN/E5CN-U

This Best-selling General-purpose 48×48-mm Temperature Controller Is Now Even Better. USB-Serial Conversion Cable and Support Software Are Also Available.

- Controllers now available with analog inputs.
- Faster sampling at 250 ms.
- Transfer output provided for easy output to recorders.
- Voltage outputs (to drive SSRs) for both heating and cooling control. Can be used for alarms to provide three alarm outputs.
- Models available with three-phase heater burnout detection and SSR fault detection.
- Easy setting with 11-segment displays.
- Connect to either a thermocouple or platinum resistance thermometer with the same model.
- Easily see the status from a distance with PV display with three-color switching function.
- Setting protection indicator informs operator when protection is enabled.
- Manual output provided.
- Controller available with long-life relay output.
- Models available with external power supply for ES1B Infrared Thermosensor.

Note: Refer to Precautions on page 21.

Features

Improved Functions for a Wider Range of Application

Control Analog Values, such as Pressures, Flowrates, and Levels

The E5CN Series now also includes models that accept analog inputs, enabling control applications other than for temperature, including pressure, flowrate, level, humidity, and weight control.

Note: E5CN-□L (Models with Analog Inputs)

Faster Sampling at 250 ms

The previous sampling time of 500 ms has been reduced by half to 250 ms. This enables the E5CN to handle application requiring even greater response speed and accuracy.

Easy Connector to a Recorder

A transfer output now makes it easy to connect to a recorder or PLC Analog I/O Unit.

Note: E5CN-C□ (Models with Current Outputs)



Note: Refer to page 19 for information on changes in comparison to previous models.

Voltage Outputs (to Drive SSRs) for Both Heating and Cooling Control. Can Be Used for Alarms to Provide Three Alarm Outputs.

Voltage outputs can be used for both heating and cooling for Models with Two Control Outputs. Also, control output 2 can be set for use as an alarm output, to enable using up to three alarm outputs.

Note: E5CN-□Q (Option Board)

Three-phase Heater Burnout Detection

With Models with Three-phase Heater Burnout and SSR Failure Detection, two current transformers can be connected to detect both heater burnout and SSR failure at the same time, reducing costs because a separate heater burnout alarm device is not required. SSR failure detection can be used even with Models with Single-phase Heater Burnout Alarms.

Note: E5CN-□HH□ (Option Board)

E58-CIFQ1 USB-Serial Conversion Cable for Computer Connection

A personal computer connection is possible for models without communications.

The CX-Thermo Support Software (sold separately) can be used to set parameters, monitor operation, and parameter masks. The free ThermoMini Parameter Copy Software can be used to reach E5CN parameters using communications and copy them to another E5CN to increase onsite productivity.

Specifications: page 5, Dimensions: page 11



Related Product

- EST2-2C-MV1 CX-Thermo Support Software: page 24
- ES1B Infrared Thermosensor: page 26

Model Number Structure

■ Model Number Legend

Controllers

E5CN-□□M□-500

1 2 3 4

1. Output type

- R: Relay
- Q: Voltage (for driving SSR)
- C: Current
- Y: Long-life relay

2. Number of alarms

- Blank: No alarm
- 2: Two alarms

3. Option Unit

- M: Option Unit can be mounted

4. Input type

- T: Thermocouple/platinum resistance thermometer (multi-input)
- L: Analog input

Option Units

E53-CN-□N

1

1. Functions

- H03: Communications and heater burnout/SSR failure detection
- 03: Communications
- HB: Heater burnout/SSR failure detection and event inputs
- B: Event inputs
- HH03: Communications and 3-phase heater burnout/SSR failure detection
- Q03: Communications and control output 2 (voltage output)
- QH: Heater burnout/SSR failure detection and control output 2 (voltage output)
- PB: External power supply for ES1B and event inputs
- PH: External power supply for ES1B and heater burnout/SSR failure detection.

Note: 1. The heating and cooling function is available for models with two alarm points.

2. Current transformers (CTs) are not provided with the Units. Be sure to order CTs when ordering the E5CN and the Option Units.

3. Specify the power supply specifications when ordering.

This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

| E5CN/E5CN-U Temperature Controller User's Manual (Cat. No. H129)

| E5CN Temperature Controller Communications User's Manual (Cat. No. H130)

Ordering Information

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RMT-500
			Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
		2	Relay	E5CN-R2MT-500
		2	Voltage (for driving SSR)	E5CN-Q2MT-500
		2	Current	E5CN-C2MT-500
		2	Long-life relay	E5CN-Y2MT-500
		0	Relay	E5CN-RMT-500
24 VAC/DC	0	0	Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
			Relay	E5CN-R2MT-500
		2	Voltage (for driving SSR)	E5CN-Q2MT-500
		2	Current	E5CN-C2MT-500
		2	Relay	E5CN-Y2MT-500

■ Controllers with Analog Inputs

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RML-500
			Voltage (for driving SSR)	E5CN-QML-500
			Current	E5CN-CML-500
		2	Relay	E5CN-R2ML-500
		2	Voltage (for driving SSR)	E5CN-Q2ML-500
		2	Current	E5CN-C2ML-500
		2	Long-life relay	E5CN-Y2ML-500
		2	Relay	E5CN-R2ML-500
24 VAC/DC	24 VAC/DC	2	Voltage (for driving SSR)	E5CN-Q2ML-500
			Current	E5CN-C2ML-500

■ Option Units

The E5CN provides optional functionality when one of the following Option Units is mounted.

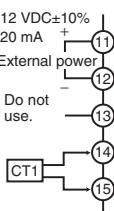
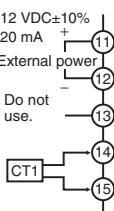
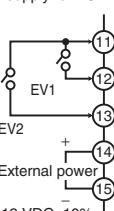
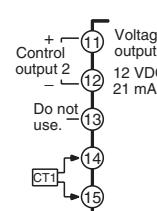
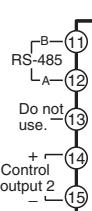
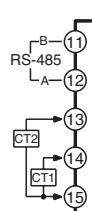
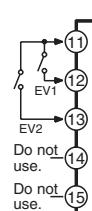
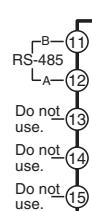
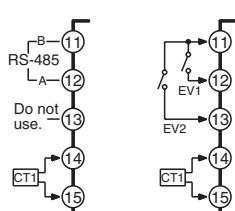
Functions		Model
Communications	Heater burnout/SSR failure detection	E53-CNH03N
Communications		E53-CN03N
	Heater burnout/SSR failure detection	E53-CNHB
	Event inputs	E53-CNB
Communications	3-phase heater burnout/SSR failure detection	E53-CNHH03N
Communications		E53-CNQ03N
	Heater burnout/SSR failure detection	E53-CNQH
	Event inputs	E53-CNPBN (See note 1.)
	Heater burnout/SSR failure detection	E53-CNPHN (See note 1.)

Note: 1. E53-CNPBN and E53-CNPHN cannot be mounted on E5CN-C□□ (current output models).

2. Option Units cannot be used for Plug-in models.

These Option Units can be used for the new E5CN models only.

E53-CNH03N Communications/ CT	E53-CNHB Event inputs/ CT	E53-CN03N Communications	E53-CNB Event inputs	E53-CNHH03N Communications/ Two CTs	E53-CNQ03N Communications/ Control output 2	E53-CNQH Control output 2/ CT	E53-CNPBN Event inputs/ External power supply for ES1B	E53-CNPHN External power supply for ES1B/CT
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Attach the appropriate terminal labels.

Model Number Structure

■ Model Number Legend (Plug-in-type Controllers)

E5CN-□□□U
1 2 3 4

1. Output type

R: Relay

Q: Voltage

2. Number of alarms

Blank: No alarm

1: One alarm

2: Two alarms

3. Input type

T: Thermocouple/platinum resistance thermometer (multi-input)

4. Plug-in type

U: Plug-in type

Ordering Information (Plug-in-type Controllers)

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN	100 to 240 VAC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU
	24 VAC/DC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU

Note: Option Units (E53-CN□□N) cannot be used for Plug-in models.

■ Accessories (Order Separately)

USB-Serial Conversion Cable

Model	
E58-CIFQ1	

Terminal Cover

Connectable models	Terminal type
Model	E53-COV10

Note: The Terminal Cover comes with the E5CN-□□□-500 models.

Current Transformers (CTs)

Model	E54-CT1	E54-CT3
Hole diameter	5.8 dia.	12.0 dia.

Adapter

Connectable models	Terminal type
Model	Y92F-45

Note: Use this Adapter when the panel has been previously prepared for the E5B□.

Sockets

(for Models with Plug-in Connectors)

Model	P2CF-11	P2CF-11-E	P3GA-11	Y92A-48G
Type	Front-connecting Socket	Front-connecting Socket with Finger Protection	Back-connecting socket	Terminal Cover for Finger Protection

Specifications

■ Ratings

Item	Power supply voltage	100 to 240 VAC, 50/60 Hz		24 VAC, 50/60 Hz or 24 VDC		
Operating voltage range		85% to 110% of rated supply voltage				
Power consumption	E5CN	7.5 VA max. (E5CN-R2T: 3.0 VA at 100 VAC)	5 VA/3 W max. (E5CN-R2T: 2.7 VA at 24 VAC)			
	E5CN-U	6 VA max.	3 VA/2 W max.			
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, or B Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 160 to 260°C Voltage input: 0 to 50 mV				
		Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V				
Input impedance		Current input: 150 Ω, Voltage input: 1 MΩ (Use a 1:1 connection when connecting the ES2-HB.)				
Control output	Relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA			
		E5CN-U	SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA			
	Voltage output	E5CN E5CN-U	Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit			
	Current output	E5CN	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,700			
	Long-life relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)			
Alarm output		SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 1 V, 1 mA				
Event input	Contact input	ON: 1 kΩ max., OFF: 100 kΩ min.				
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.				
		Outflow current: Approx. 7 mA per point				
External power supply for ES1B		12 VDC ±10%, 20 mA, Short-circuit protection provided.				
Control method		ON/OFF control or 2-PID control (with auto-tuning)				
Setting method		Digital setting using front panel keys				
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: PV: 11 mm, SV: 6.5 mm				
Other functions		Manual output, heating/cooling control, transfer output (on some models), loop break alarm, multi SP, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, etc.				
Ambient operating temperature		-10 to 55°C (with no icing or condensation), for 3-year warranty: -10 to 50°C				
Ambient operating humidity		25% to 85%				
Storage temperature		-25 to 65°C (with no icing or condensation)				

■ Input Ranges

Thermocouples/Platinum Resistance Thermometers (Multi-inputs)

Input Type	Thermocouple												Infrared temperature sensor				Analog input							
	Pt100		JPt100		K	J	T	E	L	U	N	R	S	B	10 to 70°C	60 to 120°C	115 to 165°C	160 to 260°C	0 to 50 mV					
Temperature range (°C)																			Usable in the following ranges by scaling: -1999 to 9999 or -199.9 to 999.9					
Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

The applicable standards for the input types are as follows:

U: Cu-CuNi, DIN 43710-1985
Pt100: IEC 751

Shaded settings are the default settings.

K, J, T, E, N, R, S, B: IEC584-1

L: Fe-CuNi, DIN 43710-1985

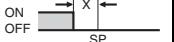
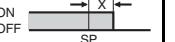
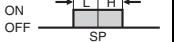
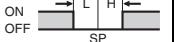
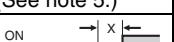
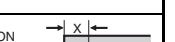
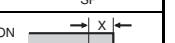
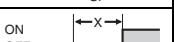
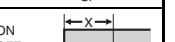
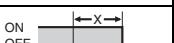
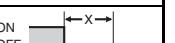
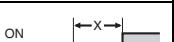
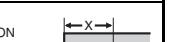
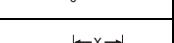
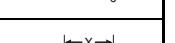
Models with Analog Inputs

Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

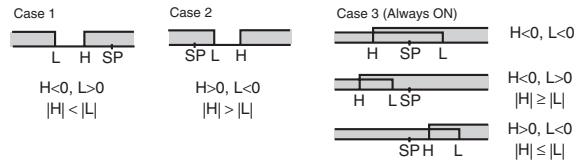
■ Alarm Types

Select alarm types out of the 12 alarm types listed in the following table.

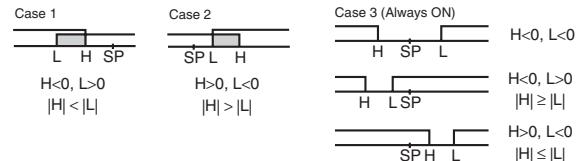
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit	ON OFF  (See note 2.)	(See note 2.)
2	Upper limit	ON OFF 	ON OFF 
3	Lower limit	ON OFF 	ON OFF 
4 (See note 1.)	Upper- and lower-limit range	ON OFF 	(See note 3.)
5 (See note 1.)	Upper- and lower-limit with standby sequence	ON OFF 	(See note 4.)
6	Upper-limit with standby sequence	ON OFF 	ON OFF 
7	Lower-limit with standby sequence	ON OFF 	ON OFF 
8	Absolute-value upper-limit	ON OFF 	ON OFF 
9	Absolute-value lower-limit	ON OFF 	ON OFF 
10	Absolute-value upper-limit with standby sequence	ON OFF 	ON OFF 
11	Absolute-value lower-limit with standby sequence	ON OFF 	ON OFF 
12 (See note 6.)	LBA (for alarm 1 only)	---	

Note: 1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

2. Set value: 1, Upper- and lower-limit alarm



3. Set value: 4, Upper- and lower-limit range



4. Set value: 5, Upper- and lower-limit with standby sequence
For Upper- and Lower-Limit Alarm Described Above

- Case 1 and 2
Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

5. Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

6. Set value: 12, LBA can be set only for alarm 1.

Set the alarm types for alarms 1 to 3 independently in the initial setting level. The default setting is 2 (upper limit).

■ Characteristics

Indication accuracy	Thermocouple: (See note 1.) E5CN: ($\pm 0.5\%$ of indicated value or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. E5CN-U: ($\pm 1\%$ of indicated value or $\pm 2^\circ\text{C}$, whichever is greater) ± 1 digit max. Platinum resistance thermometer: ($\pm 0.5\%$ of indicated value or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. Analog input: $\pm 0.5\%$ FS ± 1 digit max. CT input: $\pm 5\%$ FS ± 1 digit max.
Hysteresis	Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band (P)	Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s) (See note 3.)
Control period	0.5, 1 to 99 s (in units of 1 s)
Manual reset value	0.0 to 100.0% (in units of 0.1%)
Alarm setting range	-1999 to 9999 (decimal point position depends on input type)
Sampling period	250 ms
Affect of signal source resistance	Thermocouple: $0.1^\circ\text{C}/\Omega$ max. (100 Ω max.) (See note 4.) Platinum resistance thermometer: $0.4^\circ\text{C}/\Omega$ max. (10 Ω max.)
Insulation resistance	20 M Ω min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	Malfunction 10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions
	Destruction 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction 100 m/s ² min., 3 times each in X, Y, and Z directions
	Destruction 300 m/s ² min., 3 times each in X, Y, and Z directions
Weight	E5CN Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g
	E5CN-U Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g
Degree of protection	E5CN Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IP20, Terminal section: IP00
	E5CN-U Front panel: Equivalent to IP50, rear case: IP20, terminals: IP00
Memory protection	Non-volatile memory (number of writes: 1,000,000 operations)
EMC	Emission Enclosure: EN55011 Group1 ClassA Emission AC Mains: EN55011 Group1 ClassA Immunity ESD: EN61000-4-2 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Immunity Conducted Disturbance: EN61000-4-6 3 V (0.15 to 80 MHz) (level 2) Immunity Burst: EN61000-4-4 2 kV Power-line (level 3) 1 kV I/O signal-line (level 3) Immunity Surge: EN61000-4-5 1kV line to line Power line, output line (relay output) 2 kV line to ground Power line, output line (relay output) 1 kV line to ground Input line (communication) Immunity Voltage Dip/Interrupting: EN61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards	UL 61010C-1 CSA C22.2 No.1010.1
Conformed standards	EN61326, EN61010-1, IEC61010-1 VDE0106 Part 100 (Finger protection), when the terminal cover is mounted.

Note: 1. The indication of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperature is $\pm 2^\circ\text{C} \pm 1$ digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is $\pm 3^\circ\text{C} \pm 1$ digit max.

2. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is $^\circ\text{C}$ or $^\circ\text{F}$.
3. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).
4. B, R, and S sensors: $0.2^\circ\text{C}/\Omega$ max. (100 Ω max.)

■ USB-Serial Conversion Cable

Applicable OS	Windows 2000/XP
Applicable software	Thermo Mini, CX-Thermo
Applicable models	E5CN/E5CN-U Series
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	-20 to -60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

■ Communications Specifications

Transmission line connection method	RS-485 multipoint
Communications	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission code	ASCII
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485
Retry function	None
Communications buffer	40 bytes
Communications response wait time	0 to 99 ms Default: 20 ms

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

■ Current Transformer (Sold Separately)

Ratings

Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s ²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

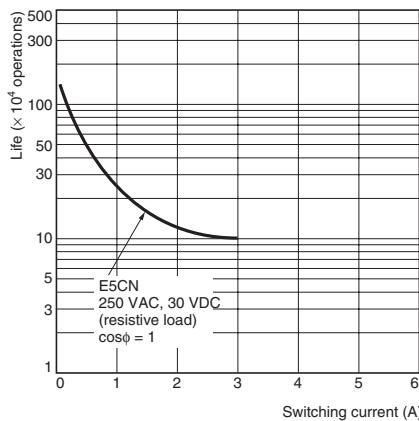
■ Heater Burnout Alarms and SSR Failure Detection Alarms

(E5CN Models with Heater Burnout and SSR Failure Detection Alarms)

Maximum heater current	50 A AC
Input current indication accuracy	$\pm 5\%$ FS ± 1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned OFF. 50.0 A: Heater burnout/SSR failure alarm output turned ON. Minimum detection ON time: 190 ms (See note 1.)
SSR failure detection alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned ON. 50.0 A: Heater burnout/SSR failure alarm output turned OFF. Minimum detection OFF time: 190 ms (See note 2.)

Note: 1. If the ON time of control output 1 is less than 190 ms, heater burnout detection and the heater current will not be measured.
2. If the OFF time of control output 1 is less than 190 ms, SSR failure detection and the heater current will not be measured.

■ Electrical Life Expectancy Curve for Relays (Reference Values)



Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

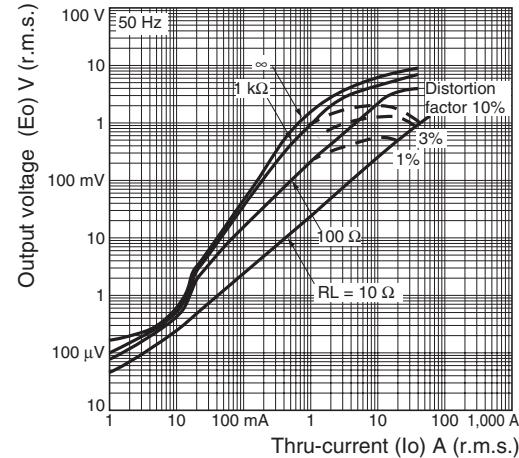
E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 50 A (50/60 Hz)

Number of windings: 400 ± 2

Winding resistance: 18 ± 2 Ω



E54-CT3

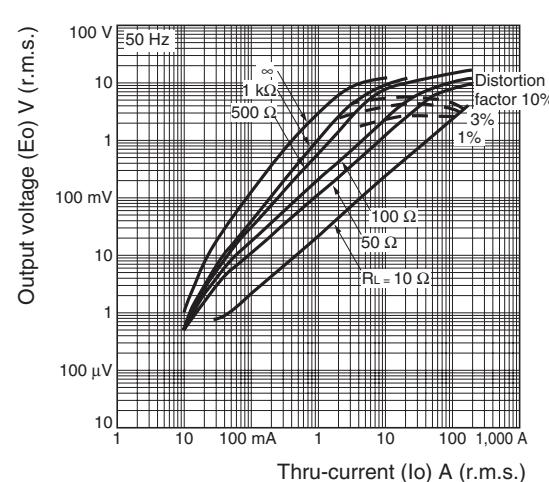
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz)

(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)

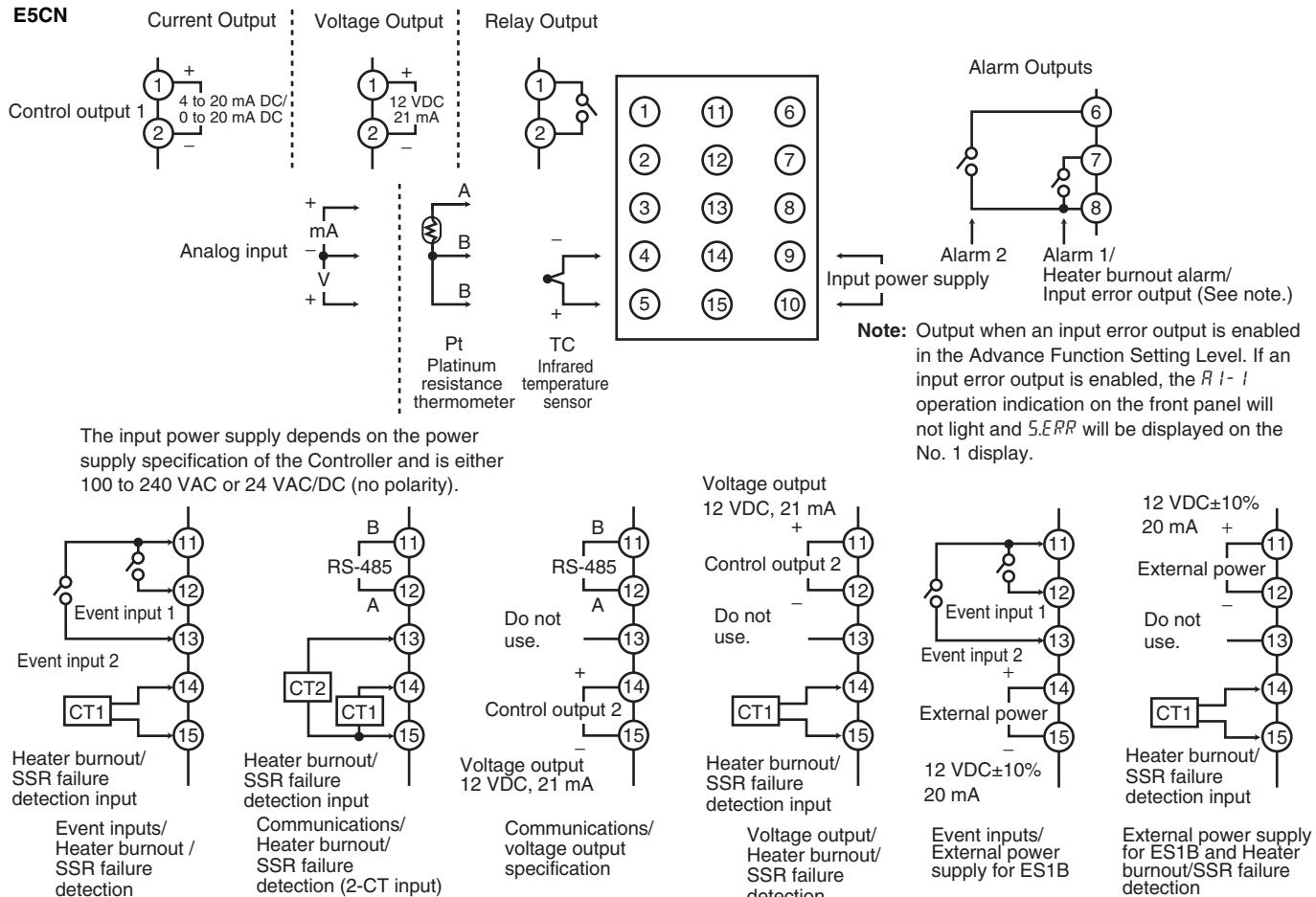
Number of windings: 400 ± 2

Winding resistance: 8 ± 0.8 Ω

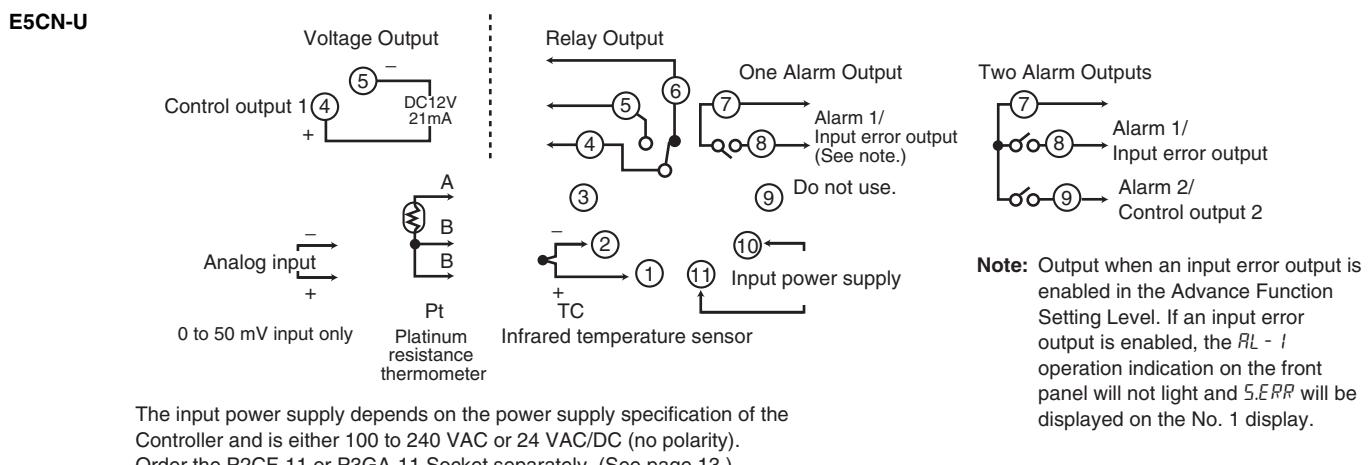


External Connections

- A voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.
- Standard insulation is applied between any of the following: power supply terminals, input terminals, output terminals, and communications terminals (for models with communications). If reinforced insulation is required, provide additional insulation, such as spacial distance or material insulation, as defined by IEC 60664 suitable for the maximum operating voltage.
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.



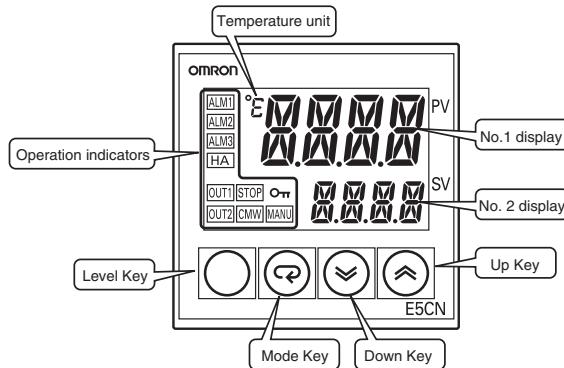
Terminals 11 to 15 do not exist on models without an Option Unit (heater burnout detection, control output 2, event inputs, or communications). Terminal applications depend on the model of the Option Unit. Refer to page 3.



Nomenclature

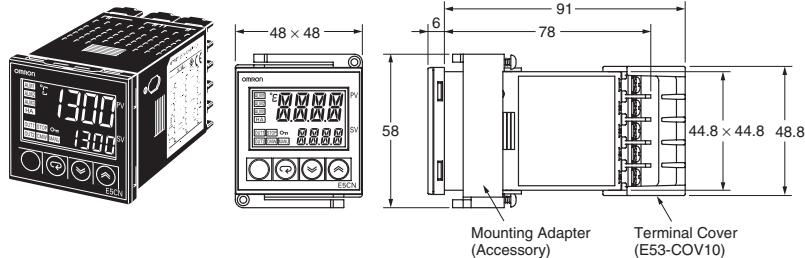
E5CN E5CN-U

The front panel is the same for the E5CN and E5CN-U.



Dimensions

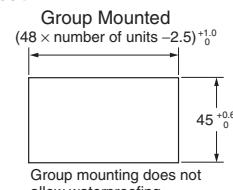
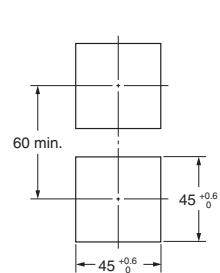
E5CN Terminal Models



Note: The terminal block cannot be removed.
The suffix "500" is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

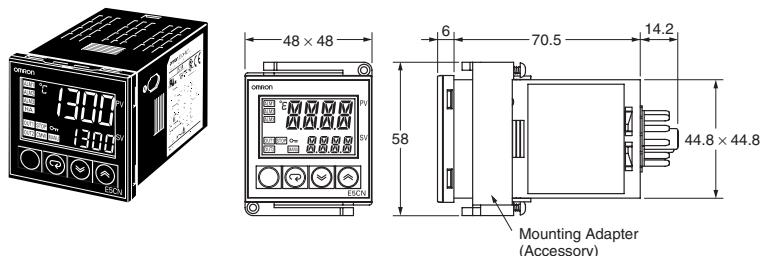
Panel Cutout

Mounted Separately



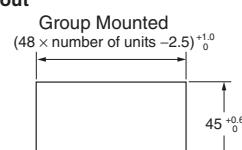
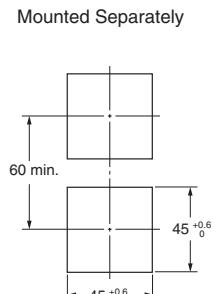
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

E5CN-U Plug-in Models



Panel Cutout

Mounted Separately

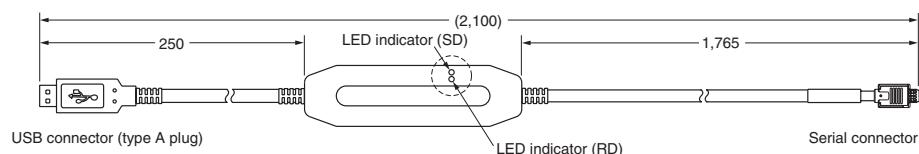
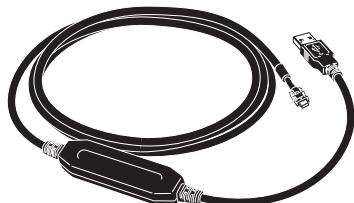


- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

■ Accessories

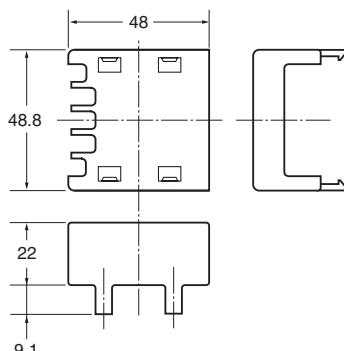
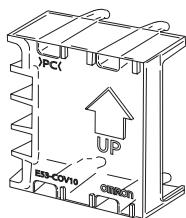
USB-Serial Conversion Cable (Sold Separately)

E58-CIFQ1



Terminal Cover

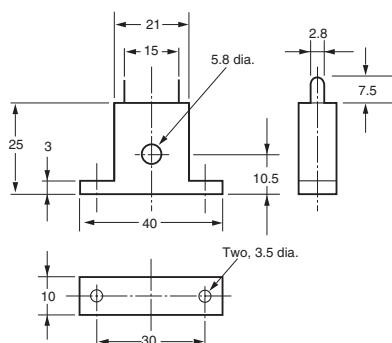
E53-COV10



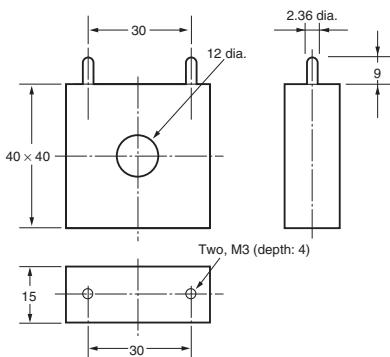
Note: The suffix “-500” is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

Current Transformers (Sold Separately)

E54-CT1

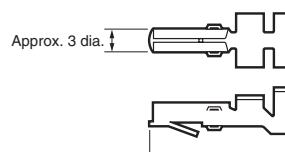


E54-CT3

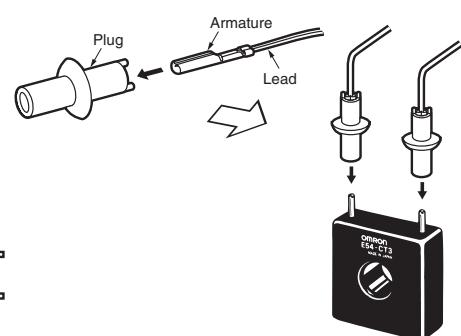


E54-CT3 Accessory

• Armature



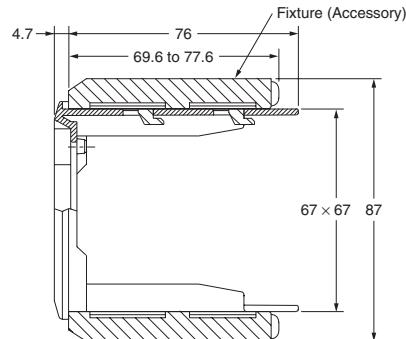
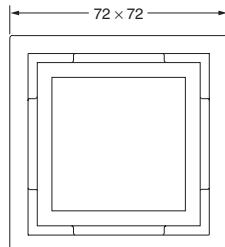
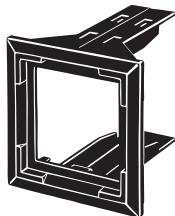
Connection Example



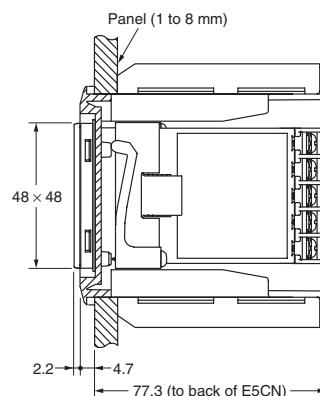
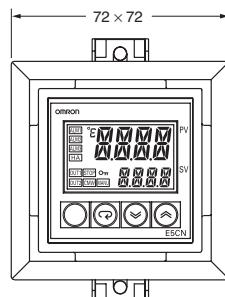
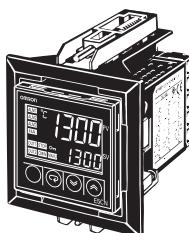
Adapter (Sold Separately)

Note: Use this Adapter when the panel has already been prepared for the E5B□.

Y92F-45



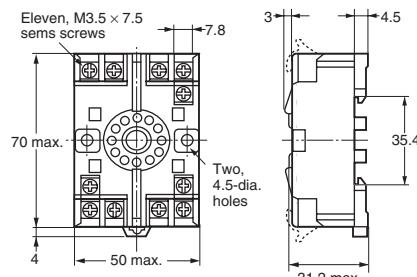
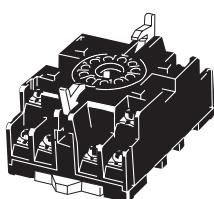
Mounted to E5CN



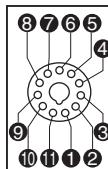
E5CN-U Wiring Socket (Sold Separately)

Front-connecting Socket

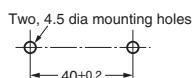
P2CF-11



Terminal Layout/Internal Connections (Top View)



Mounting Holes

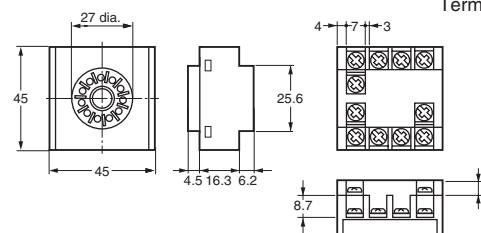
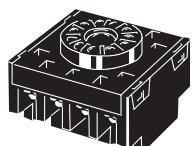


Note: Can also be mounted to a DIN track.

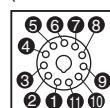
Note: A model with finger protection (P2CF-11-E) is also available.

Back-connecting Socket

P3GA-11



Terminal Layout/Internal Connections (Bottom View)



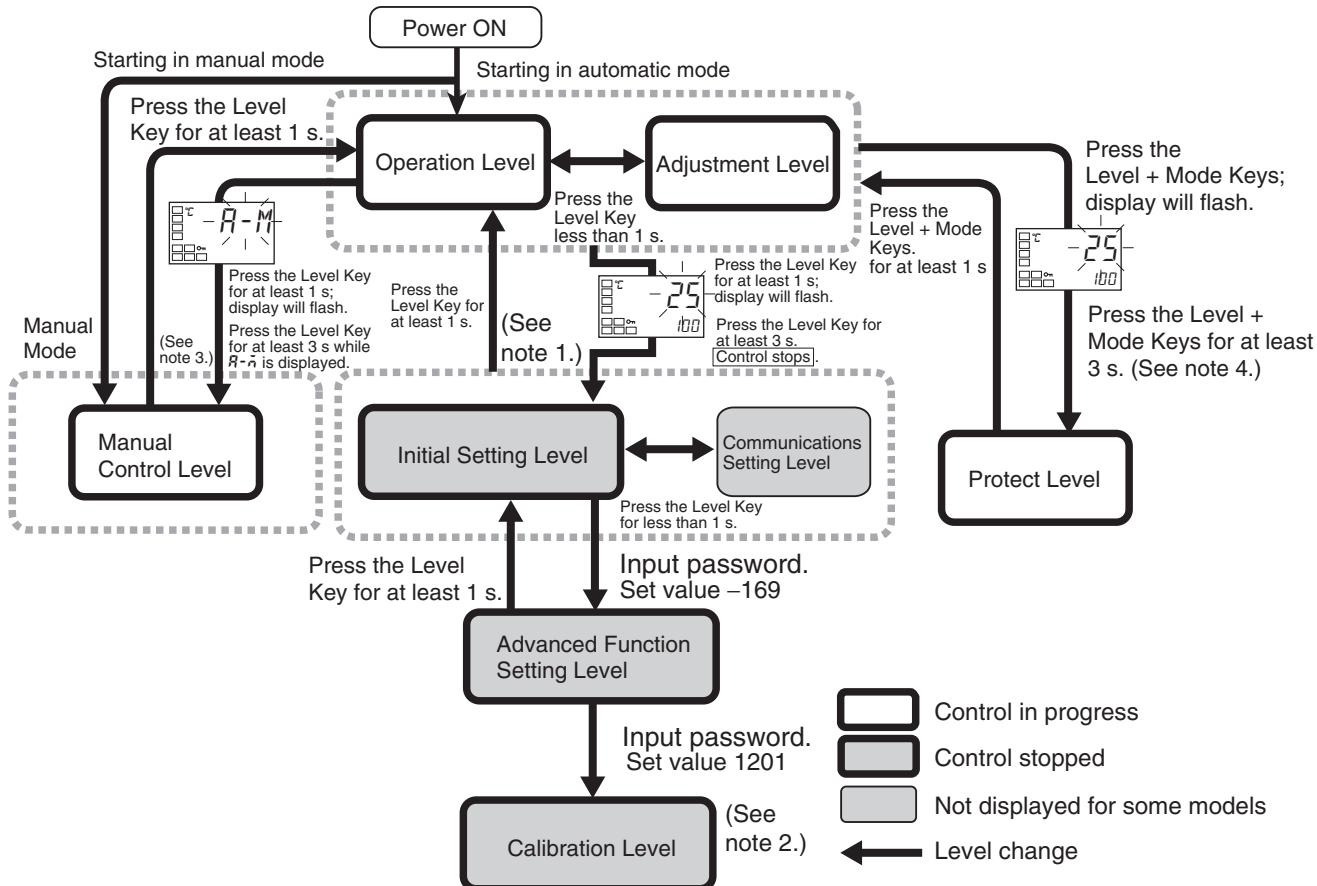
Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.

2. A Protective Cover for finger protection (Y92A-48G) is also available.

Operation

■ Outline of Operation Procedures

The following diagram illustrates the entire setting level. A password is required to enter the advance function setting level and the calibration level. Some parameters may not be displayed depending on the protection settings and operation conditions. The control operation will stop when switching from operation level to initial setting level.



Troubleshooting

If an error occurs, an error message will be displayed on the No. 1 display. Use the error message to check the type of error and correct the error accordingly.

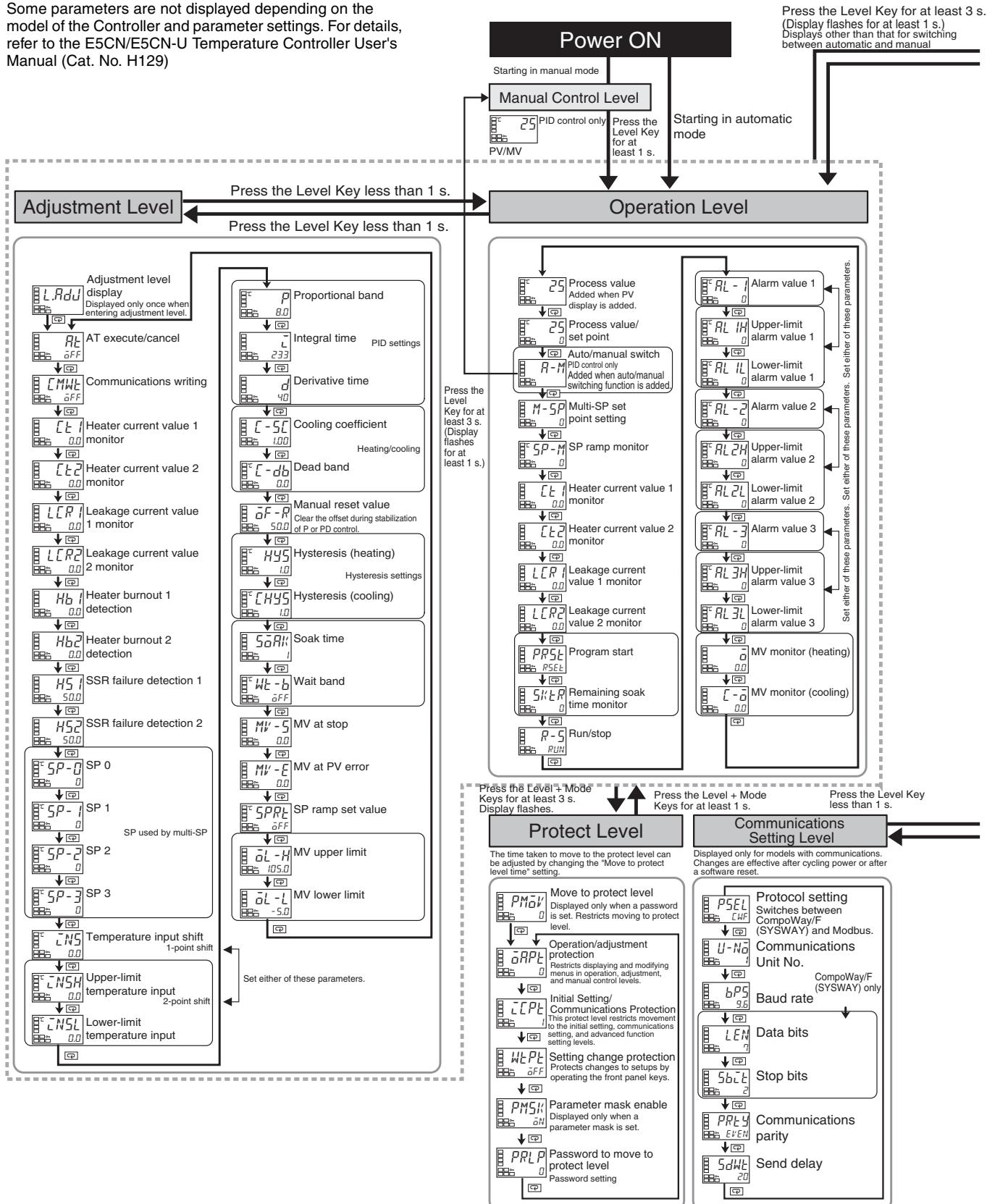
No. 1 display	Error	Correction	Output status at error	
			Control outputs	Alarm outputs
5.ER ^R (S. Err)	Input error (See note 2.)	Check for input wiring errors, broken wires, short-circuits, and input type error.	OFF	Handled as abnormally high temperature
	A/D converter error (See note 2.)	Check for an input error and then cycle the power supply. If the same error is still displayed, repairs will be necessary. If the Temperature Controller is normal after cycling the power supply, the error may have been caused by noise. Check for noise being generated nearby.	OFF	OFF
E111 (E111)	Memory error	Cycle the power supply. If the same error is still displayed, repairs will be necessary. If the Temperature Controller is normal after cycling the power supply, the error may have been caused by noise. Check for noise being generated nearby.	OFF	OFF
H.ER ^R (H. Err)	Internal circuit error (See note 2.)		OFF	OFF

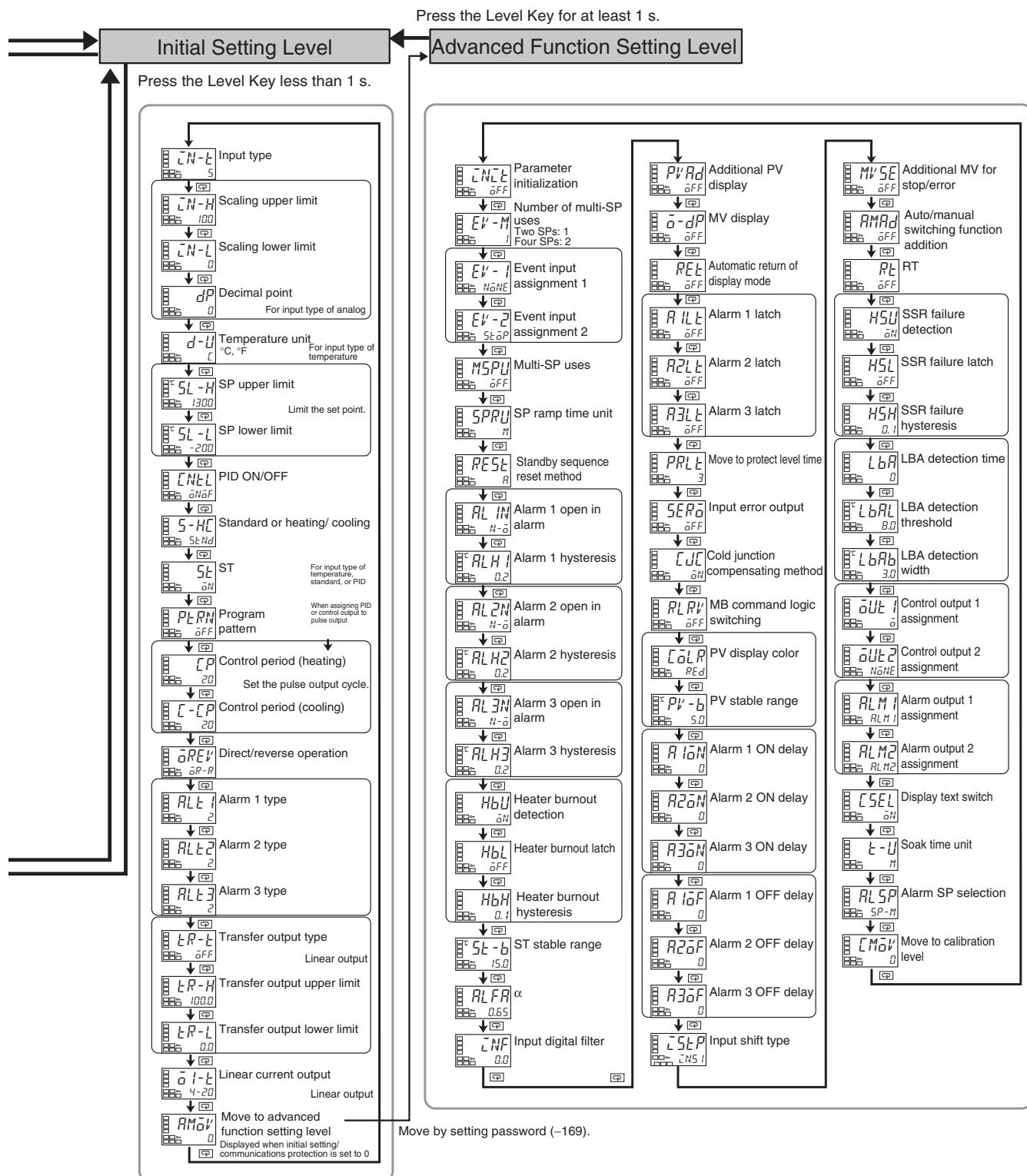
Note:

- If the input exceeds is within the controllable range but exceeds the display range (-1999 to 9999), **CCCC** will be displayed if the temperature is less than -1999 and **FFFF** will be displayed if the temperature is more than 9999. The control and alarm outputs will function normally during these displays. Refer to the E5CN/E5CN-U Temperature Controller User's Manual (Cat. No. H129) for information on the controllable range.
- These errors are displayed only when the PV/SP is displayed. Errors are not displayed in other display modes.

■ Parameters

Some parameters are not displayed depending on the model of the Controller and parameter settings. For details, refer to the E5CN/E5CN-U Temperature Controller User's Manual (Cat. No. H129)





Improvements to E5CN Functionality

■ Changes

Model numbers have been changed to allow for multi-input specifications.

Before Change

E5CN-□□□TC (models for thermocouples)
E5CN-□□□P (models for platinum resistance thermometers)



After Change

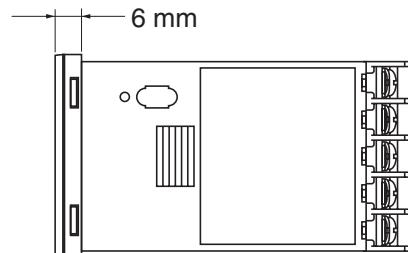
E5CN-□□□T
(Models that support both thermocouples and platinum resistance thermometers)

Precautions in Replacing Previous Controllers

- The input type setting numbers have changed to allow for multi-input specifications. (The default setting is for a K sensor between -200 and 1,300°C.)
- Previous E5CN Controllers cannot be removed from the case for replacement with new models. Replace the case at the same time.
- The previous ThermoTools cannot be used with the new Controller models. Use the ThermoTools scheduled for marketing from July 2004.
- The height of the front panel that extends when the Controller is mounted to a panel has been reduced from 9 to 6 mm.

Note: Items That Have Not Been Changed

- Panel cutout dimensions
- Panel interior dimensions for panel mounting
- Wiring terminal sizes
- Wiring terminal arrangement
- Parameter setting procedure



The following items do not change in comparison to the previous E5CN models: Panel cutout, Internal panel dimensions for panel mounting, wiring screw sizes, wiring terminal arrangement, and parameter setting methods.

■ Improved Functions

The previous and new models can be easily differentiated by looking at the front panel. The OMRON logo is in a different position.

Item	Previous models (OMRON logo: lower left)	Improved models (OMRON logo: upper left)
Front panel		

Basically, the Controllers are upwardly compatible. The terminal arrangement, terminal sizes, and depth for panel mounting have not been changed. Changes are listed in the following tables. For details, refer to the E5CN/E5CN-U Temperature Controller User's Manual (Cat. No. H129) and to the E5CN Temperature Controller Communications User's Manual (Cat. No. H130).

■ Specifications

Ratings

Item		Previous models	Improved models
Power consumption	E5CN	7 VA (100 to 240 VAC, 50/60 Hz) 4 VA/3 W (24 VAC, 50/60 Hz or 24 VDC)	7.5 VA (100 to 240 VAC, 50/60 Hz) 4 VA/3 W (24 VAC, 50/60 Hz or 24 VDC)
	E5CN-U	6 VA (100 to 240 VAC, 50/60 Hz) 3 VA/2 W (24 VAC, 50/60 Hz or 24 VDC)	6 VA (100 to 240 VAC, 50/60 Hz) 3 VA/2 W (24 VAC, 50/60 Hz or 24 VDC)
Sensor input		E5CN-□□TC Thermocouple: K, J, T, E, L, U, N, R, S, or B Infrared temperature sensor: 10 to 70°C, 60 to 120°C or 115 to 165°C (160 to 260°C) Voltage input: 0 to 50 mV	E5CN-□□T (Multi-input models) Thermocouple: K, J, T, E, L, U, N, R, S, or B Infrared temperature sensor: 10 to 70°C, 60 to 120°C or 115 to 165°C (160 to 260°C) Voltage input: 0 to 50 mV
		E5CN-□□P Platinum resistance thermometer: Pt100 or JPt100	Platinum resistance thermometer: Pt100 or JPt100
		(No models with analog inputs)	E5CN-□□L (Models with analog inputs added.) Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V
Control output	Relay	E5CN-R□□ SPST-NO, 250 VAC, 3 A (resistive load) Electrical life: 100,000 operations min.	E5CN-R□□ SPST-NO, 250 VAC, 3 A (resistive load) Electrical life: 100,000 operations min.
		---	E5CN-Y□□ (Added models with long-life relay outputs.) SPST-NO, 250 VAC, 3 A (resistive load) Electrical life: 1,000,000 operations min. DC loads cannot be connected.
	Voltage	E5CN-Q□□ 12 VDC ±15% (PNP) Max. load current: 21 mA With short-circuit protection	E5CN-Q□□ 12 VDC ±15% (PNP) Max. load current: 21 mA With short-circuit protection
	Current	E5CN-C□□ 4 to 20 mA DC Load: 600 Ω max. Resolution: Approx. 2,600	E5CN-C□□ 4 to 20 mA DC or 0 to 20 mA DC Load: 600 Ω max. Resolution: Approx. 2,700
Control output 2	Voltage	(No models with two control outputs)	(Option Unit) 12 VDC ±15% (PNP) Max. load current: 21 mA With short-circuit protection
Display method		7-segment digital display and single-LED indicators Character height: PV: 9.9 mm, SV: 6.4 mm	11-segment digital display and single-LED indicator (Improved visibility) (A 7-segment digital display also possible.) Character height: PV: 11.0 mm, SV: 6.5 mm
Transfer output		(No models with transfer outputs)	E5CN-C□□ (current output) Allocated to current output 4 to 20 mA DC or 0 to 20 mA DC Load: 600 Ω max. Resolution: Approx. 2,700

Other Functions

Item	Previous models	Improved models
Display	---	Parameter mask function (provided with EST2 Support Software)
	PV display switch between 2 colors (red/green)	PV display switch between 3 colors (red/orange/green)
	---	Display character switch (7-segment/11-segment)
Input	Temperature input shift (1-point shift for temperature input, 2-point shift for no-contact sensor input)	Temperature input shift (2-point shift also possible for temperature input)
Output	---	Manual outputs
	---	MV at stop
	---	MV at PV error
	---	Loop break alarm
Control	Control period: 1 to 99 s	Control period: 0.5 or 1 to 99 s
	---	Robust tuning
Alarm	---	Alarm delays
	---	Alarm SP selection (selection of alarm operation during SP ramp)
Other	---	Simple programming function
	---	Password to move to protect level
	---	Communications port for Support Software

Characteristics

Item	Previous models	Improved models
Sampling period	500 ms	250 ms

Communications Specifications

Item	Previous models	Improved models
Communications protocols	CompoWay/F (SYSWAY)	CompoWay/F (SYSWAY), Modbus
Baud rate	1,200, 2,400, 4,800, 9,600, 19,200 bps	1,200, 2,400, 4,800, 9,600, 19,200, 38,400 bps

Heater Burnout/SSR Failure Detection Characteristics

Item	Previous models	Improved models
Maximum heater current	Option Units Single-phase 50 A VAC	Option Units Single-phase 50 A AC
	---	Option Units (two CT inputs) Three-phase 50 A AC
SSR failure detection	---	SSR failure detection

Precautions

⚠ CAUTION

Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.



Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.



Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.



Do not leave the conversion cable connected to the product. Malfunction may occur due to noise in the cable.



Do not use the Temperature Controller or Conversion Cable if it is damaged. Doing so may occasionally result in minor electric shock or fire.



Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.



CAUTION - Risk of Fire and Electric Shock

- a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
- b) More than one disconnect switch may be required to de-energize the equipment before servicing the product.
- c) Signal inputs are SELV, limited energy.
- d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits.



If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur.



Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.

Tighten the terminal screws to between 0.74 and 0.9 N·m. Loose screws may occasionally result in fire.



Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.



WARNING: To reduce the risk of electric shock or fire, install in a Pollution Degree 2 environment (a controlled environment relatively free of contaminants).



A malfunction in the product may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the product, take appropriate safety measures, such as installing a monitoring device on a separate line.



A semiconductor is used in the output section of long-life relays. If excessive noise or surge is impressed on the output terminals, a short-circuit failure is likely to occur. If the output remains shorted, fire will occur due to overheating of the heater or other cause. Take measures in the overall system to prevent excessive temperature increase and to prevent fire from spreading.



Do not allow pieces of metal or wire cuttings to get inside connectors. Failure to do so may occasionally result in minor electric shock, fire, or damage to equipment.



Do not allow dust and dirt to collect between the pins in the connector on the Conversion Cable. Failure to do so may occasionally result in fire.



Note:

- 1. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.
- 2. A class 2 power supply is one tested and certified by UL as have the current and voltage of the secondary output restricted to specific levels.

Precautions for Safe Use

1. Do not use this product in the following places:
 - Places directly subject to heat radiated from heating equipment.
 - Places subject to splashing liquid or oil atmosphere.
 - Places subject to direct sunlight.
 - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
 - Places subject to intense temperature change.
 - Places subject to icing and condensation.
 - Places subject to vibration and large shocks.
2. Use and store the product within the rated ambient temperature and humidity.
Gang-mounting two or more Temperature Controllers, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.
3. To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.
4. Be sure to wire properly with correct polarity of terminals.
5. Use specified size (M3.5, width 7.2 mm or less) crimped terminals for wiring. Use wires with a gage of AWG24 to AWG14 (equal to cross-sectional areas of 0.205 to 2.081 mm²). (The stripping length is 5 to 6 mm.)
6. Do not wire the terminals that are not used.
7. To avoid inductive noise, keep the wiring for the product's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to product wiring. Using shielded cables and using separate conduits or ducts is recommended.
Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils, or other equipment that have an inductance component).
When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the product.
Allow as much space as possible between the product and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
8. Use this product within the rated load and power supply.
9. Make sure that the rated voltage is attained within two seconds of turning the power ON.
10. Make sure the product has 30 minutes or more for warm up.
11. When executing self-tuning, turn ON power to the load (e.g., heater) at the same time as or before supplying power to the product. If power is turned ON to the product before turning ON power to the load, self-tuning will not be performed properly and optimum control will not be achieved.
12. A switch or circuit breaker must be provided close to the product. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
13. Always turn OFF the power supply before pulling out the interior of the product, and never touch nor apply shock to the terminals or electronic components. When inserting the interior of the product, do not allow the electronic components to touch the case.
14. Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
15. Design the system (e.g., control panel) considering the 2 seconds of delay that the product's output to be set after power ON.
16. The output may turn OFF when shifting to certain levels. Take this into consideration when performing control.
17. Check the orientation of the connectors on the Conversion Cable before connecting the Conversion Cable. Do not force a connector if it does not connect smoothly. Using excessive force may damage the connector.
18. Do not place heavy object on the Conversion Cable, bend the cable past its natural bending radius, or pull on the cable with undue force.

19. Do not connect or disconnect the Conversion Cable while communications are in progress. Product faults or malfunction may occur.
20. Make sure that the Conversion Cable's metal components are not touching the external power terminals.
21. Do not touch the connectors on the Conversion Cable with wet hands. Electrical shock may result.

Precautions for Correct Use

Service Life

1. Use the product within the following temperature and humidity ranges:
Temperature: -10 to 55°C (with no icing or condensation)
Humidity: 25% to 85%
If the product is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the product.
2. The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.
3. When two or more Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

Measurement Accuracy

1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
2. When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
3. Mount the product so that it is horizontally level.
4. If the measurement accuracy is low, check to see if input shift has been set correctly.

Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.

Front panel: NEMA4X for indoor use (equivalent to IP66)

Rear case: IP20, Terminal section: IP00

(E5CN-U: Front panel: Equivalent to IP50, rear case: IP20, terminals: IP00)

Operating Precautions

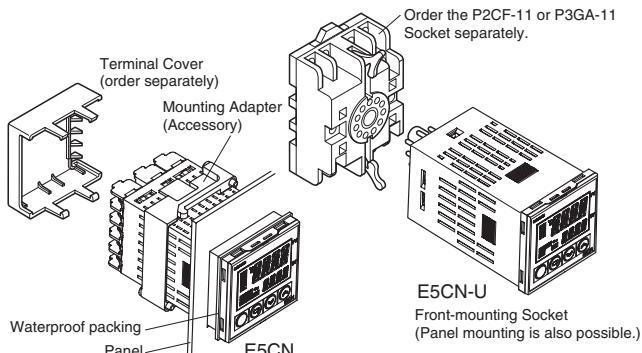
1. It takes approximately two seconds for the outputs to turn ON from after the power supply is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
2. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Temperature Controller. If power is turned ON for the Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.

- When starting operation after the Temperature Controller has warmed up, turn OFF the power and then turn it ON again at the same time as turning ON power for the load. (Instead of turning the Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
- Avoid using the Controller in places near a radio, television set, or wireless installing. These devices can cause radio disturbances which adversely affect the performance of the Controller.

USB-Serial Conversion Cable

- The disk that is included with the Conversion Cable is designed for a computer CD-ROM driver. Never attempt to play the disk in a general-purpose audio player.
- Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
- After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
- Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
- Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.

Mounting



Mounting to a Panel

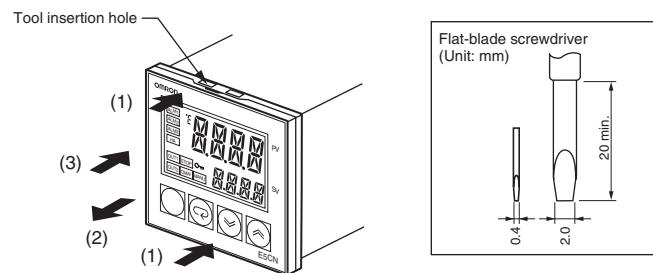
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller. Group mounting does not allow waterproofing. The waterproof packing is not required if waterproofing is not necessary. The Panel Mounting Adapter is also included with the E5CN-U. Waterproof packing is not included with the E5CN-U.
- Insert the E5CN/E5CN-U into the mounting hole in the panel.
- Push the adapter along the Controller body from the terminals up to the panel, and fasten it temporarily.
- Tighten the two fixing screws on the adapter. Alternately tighten the two screws a little at time to keep them balanced. Tighten them to a torque of 0.29 to 0.39 N·m.

Attaching the Terminal Cover

Make sure that the "UP" letters on the E5CN are at the top and insert the terminal cover into the holes at the top and bottom of the Controller.

Removing the Controller from the Case

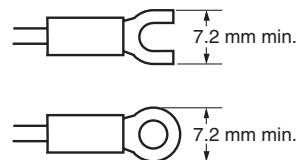
When carrying out maintenance on the Controller, the Controller can be removed from the case with the terminal leads still attached. The Controller can be removed from the case only with the E5CN. It cannot be removed with the E5CN-U.



- Insert the tool into the slots (one on the top and one on the bottom) and release the hooks.
- Insert the tool into the gap between the front panel and rear case and pull out the front panel slightly. Hold both sides of the front panel and draw out the Controller towards you. Do not apply unnecessary force.
- Before inserting the Controller, confirm that the sealing rubber is in place. Insert the Controller into the rear case until you hear a click. Press on the hooks on the top and bottom of the rear case to be sure that the hooks are securely locked in place. Be sure that electronic parts do not come in contact with the case.

Wiring Precautions

- Separate input leads and power lines to protect the Controller and its lines from external noise.
- Use wires of a thickness of AWG24 (0.205 mm²) to AWG14 (2.081 mm²). The exposed current-carrying part to be inserted into terminals must be 5 to 6 mm.
- We recommend using crimp terminals when wiring the terminals.
- Tighten terminal screws to a torque of 0.74 to 0.90 N·m.
- Use the following type of crimp terminals for M3.5 screws.

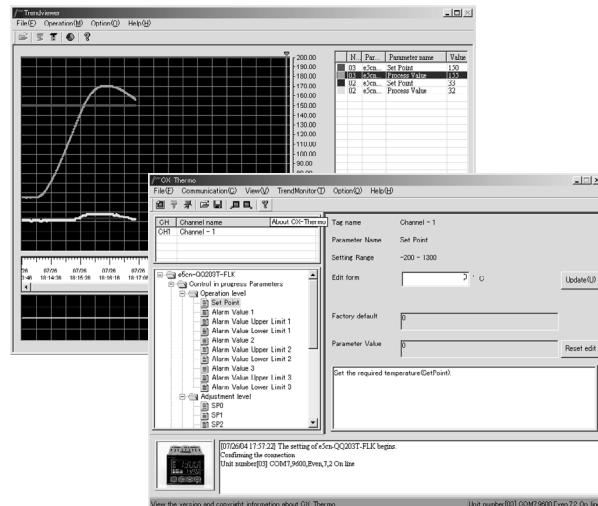


CX-Thermo Support Software Ver. 1.0

EST2

Monitoring/Setting Support Software for E5CN- and E5ZN-series Temperature Controllers Providing Easy Setup, Online Data Logging, and Realtime Monitoring.

- Enables creating, editing, and batch-downloading parameters from a personal computer, reducing the work required to set parameters.
- Supports Online Monitoring: Monitor data for up to 31 Temperature Controllers at the same time. (The Temperature Controllers must be from the same series.)
- Supports parameter masks for hiding unused parameters (E5CN only).



NEW

Ordering Information

■ List of Models

Name	Model
CX-Thermo Support Software	EST2-2C-MV1

Note: The old models of E5CN Temperature Controller (manufactured in March 2004 or earlier) are not supported.

Specifications

Basic functions	Offline	Creating, changing, and saving parameters (Some parameters must be set on the Temperature Controller. Use the switches and keys to set those parameter.)
	Online	Uploading and downloading parameters Other functions include editing parameters during operation, parameter masks (see note 1), sending operating instructions, trend monitoring, and simple data logging (See note 2).
Compatible devices	Temperature Controllers	E5CN (new models) (See note 3.), E5ZN
Personal computer system requirements	CPU	300 MHz min.
	OS	Windows 2000 or XP
	Memory	128 MB min.
	Hard disk	650 MB min. available space
	CD-ROM	One CD-ROM drive
	Monitor	SVGA (800 × 600). Recommended: XGA (1024 × 768), high color (16 bits) min.
Communications ports		<ul style="list-style-type: none"> RS-232C port, COM1 to COM8 USB port can be used if the E58-CIFQ1 is used (E5CN only). USB port can be used if the K3SC is used. (Connection to E5CN is supported only for models with communications.)

Note: 1. This function hides parameters that are not being used. The parameter mask setting can be written from the computer to the E5CN only (new E5CN models only).

2. Simple data logging enables approximately two hours of data logging when tuning. For continuous data collection, the time during which data can be collected depends on the hardware specifications of the personal computer (memory capacity and available space on the harddisk).

Data collection may not be possible during the set logging interval depending on the operating conditions (personal computer processing speed, baud rate, number of parameters, communications retries, etc.). In this case, the data will be collected in the shortest collection interval for the usage environment.

3. The old models of E5CN Temperature Controller (manufactured in March 2004 or earlier) are not supported.

Support Software for copying all E5CN parameters is also available.

The ThermoMini Parameter Copying Software is provided free-of-charge.

Compatible Temperature Controllers:

- E5CN(New models)

Functions:

- Uploading all parameters from the E5CN to the personal computer
- Downloading all parameters from the personal computer to the E5CN
- Saving uploaded data to the personal computer and outputting data as CSV files

Note: Changing parameter settings and monitoring is not supported.

Contact your OMRON representative for details.

Note: The product names in this catalog are trademarks or registered trademarks of the respective companies.

Infrared Thermosensor ES1B

Achieve Low-cost Measurements with an Infrared Thermosensor.

- The ES1B has an electromotive output as high as that of a thermocouple, thus connecting directly to the thermocouple input terminal of the Temperature Controller is possible.
- Four temperature ranges are available to cover a wide range of temperature measurement needs, including those in the food processing, packaging, molding, and electronics industries.
- High-accuracy temperature measurement is ensured by a high-speed response of 300 ms (for a 63% response) and an indication reproducibility of $\pm 1\%$ PV.
- Unlike thermocouples, the Thermosensor does not deteriorate. Therefore, stable, real-time temperature control can be maintained.



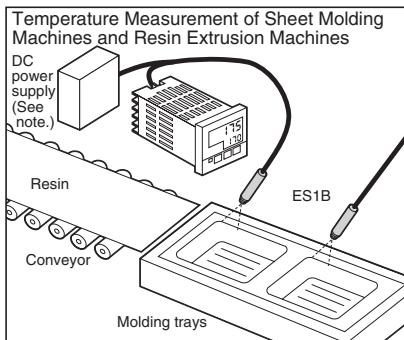
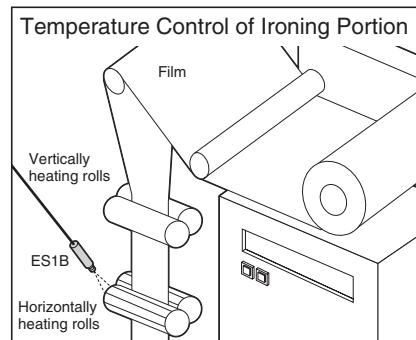
NEW

Ordering Information

■ List of Models

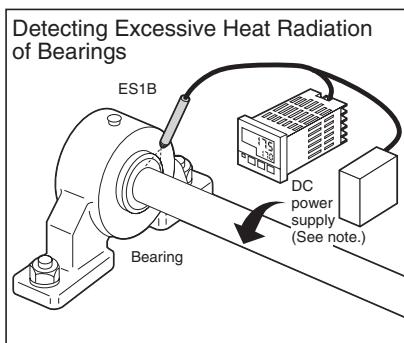
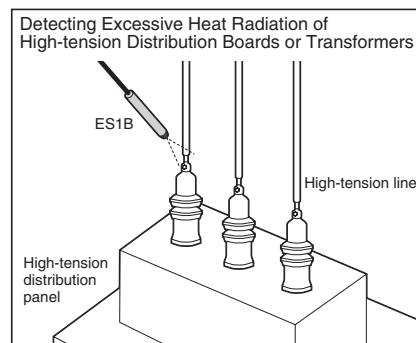
Appearance and sensing characteristic	Specification (temperature range)	Model
	10 to 70°C	ES1B
	60 to 120°C	
	115 to 165°C	
	140 to 260°C	

Application Examples

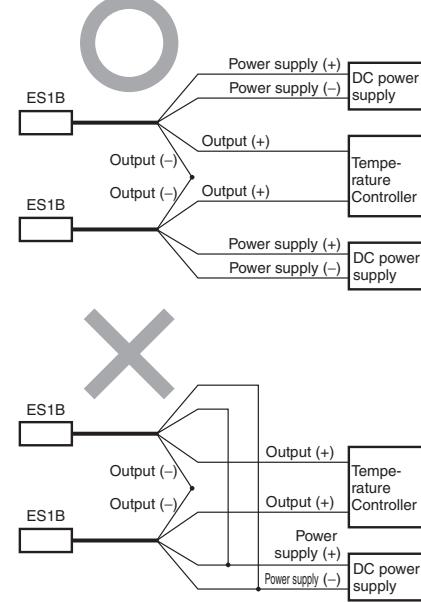


Note:

- Either a 12 VDC or 24 VDC power supply is required for the ES1B.
- The ES1B cannot be used with OMRON's E5ZE Multipoint Temperature Controller. (It can be used with the E5ZN, E5AR, and E5ER.)



Note: A DC power supply is not required when using a E5CN model with an external power supply for the ES1B.



Specifications

■ Ratings/Characteristics

Item	ES1B
Power supply voltage	12/24 VDC
Operating voltage range	90% to 110% of the power supply voltage
Current consumption	20 mA max.
Measuring temperature range	10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C
Accuracy (See note 1.)	<p>±5°C (See note 2.) ±2% PV or ±2°C, whichever is larger</p> <p>±10°C (See note 2.) ±4% PV or ±4°C, whichever is larger</p> <p>±30°C (See note 2.) ±6% PV or ±6°C, whichever is larger</p> <p>±40°C (See note 2.) ±8% PV or ±8°C, whichever is larger</p>
Reproducibility	±1% PV or ±1°C, whichever is larger
Temperature drift	0.4°C/C max.
Sensing distance vs. sensing diameter	1:1 typ.
Measurement wavelength	6.5 to 14.0 μm
Receiver element	Thermopile
Response speed	Approximately 300 ms at response rate of 63%
Output impedance	1 to 4 kΩ
Operating temperature	-25°C to 70°C (with no icing or condensation)
Allowable ambient humidity	35% to 85%
Vibration resistance (destruction)	98 m/s ² for 2 hours each in X, Y, and Z directions at 10 to 55 Hz
Shock resistance (destruction)	300 m/s ² for 3 times each in X, Y, and Z directions
Casing material	ABS resin
Degree of protection	IP65
Weight	Approx. 120 g
Cable	<p>Compensating conductor: 3 m</p> <p>PVC-covered cable with a shield wire resisting 70°C</p>

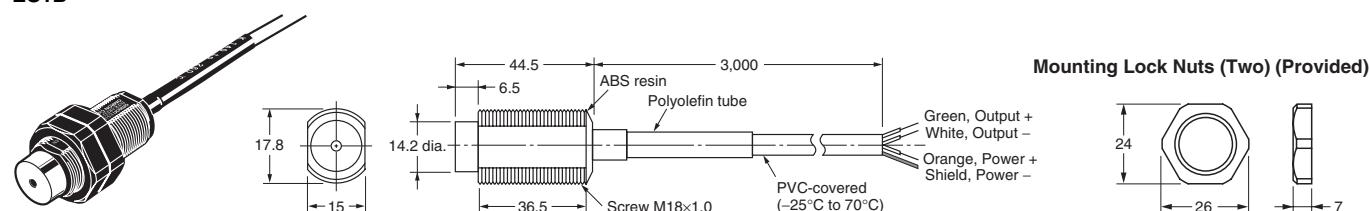
Note: 1. Based on characteristics of K-type thermocouple and radiation rate of 0.9.

2. The accuracy is given as the change in temperature from any reference temperature of the sensing object. For example, if the reference temperature is 50°C, the accuracy at 55°C would be ±2% PV or ±2°C, whichever is larger and the accuracy at 60°C would be ±4% PV or ±4°C, whichever is larger.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

ES1B

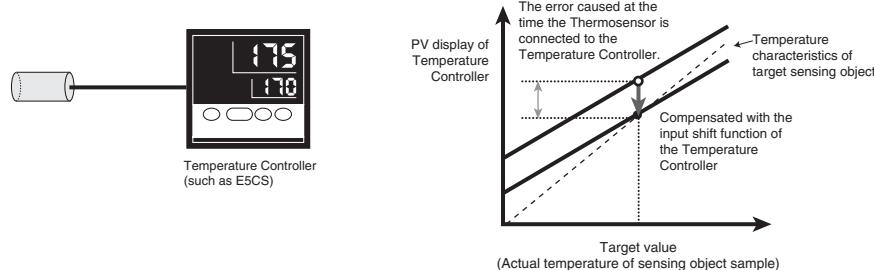


Adjustment Methods

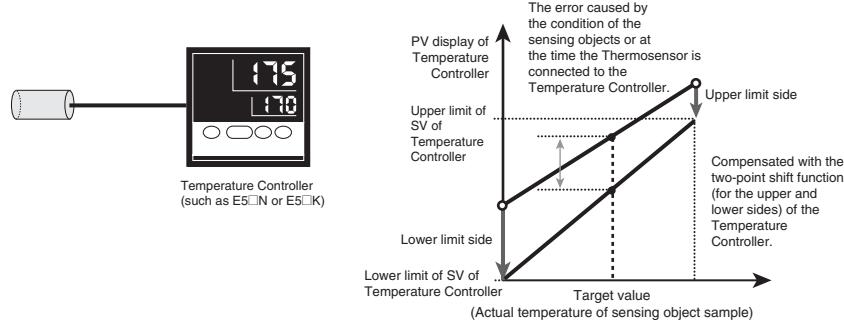
Adjust the Thermosensor as described below before using it.

Adjust the Thermosensor according to the conditions of the sensing object and characteristics of the Temperature Controller.

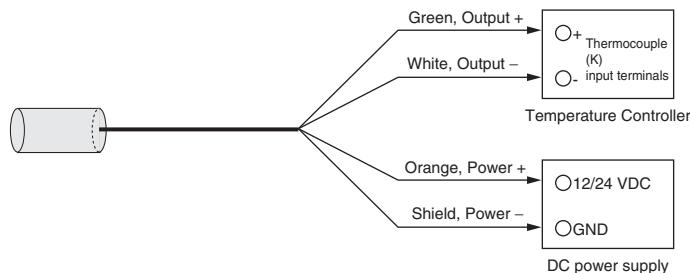
Offset Compensation for Target Value with Input Shift Function



Gain and Offset Compensation with Two-point Shift Function



Connections



Precautions

Refer the *ES1B Infrared Thermosensor Catalog* (Cat. No. H127) for safety precautions and related information.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted. IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability*.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H126-E1-02 In the interest of product improvement, specifications are subject to change without notice.

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